

Application No. 10/716,729
Amendment dated February 28, 2006
Reply to Office Action of November 30, 2005

Amendments to the Specification:

Please replace paragraph [0055] with the following amended paragraph and add paragraphs [0055A], [0055B] and [0055C] as follows:

[0055] **Fig. 7** is a disassembled perspective view of an alternative embodiment of the wafer support of **Figs. 1** and **2** that employs a segmented peripheral source 50 for providing the inductive element 23. Segmented peripheral ICP sources are more particularly described in copending U.S. Patent Application Serial No. 10/717,268 _____, Express Mail No. EV354971157US, filed on even date herewith, by the inventor hereof, and hereby expressly incorporated by reference herein in its entirety. The source 50 includes a segmented antenna which forms the inductive element 23, which is mounted in a congruent insulating plate 56 that separates the inductive device 23 from the chamber wall 12 and other conductive components of the chamber. The element 23 has terminals 51,52 that may respectively connect the inductor 23 in series between the impedances 24 and 25 (not shown in **Fig. 7**) and the ESC 21. An annular, segmented, slotted Faraday shield 53 is provided to serve as the shield 28 over the inductor 23. An insulator 54 may be provided between the shield 54 and the inductor 23. Otherwise, the inductor 23 of the source 50 may be connected in the various ways set forth above for the other inductor configurations. The embodiment of **Fig. 7** combines the features of the integrated, electrostatic, inductively-coupled wafer support (i-ESIC) 20 and the segmented peripheral ionization source of the incorporated patent application.

[0055A] In various embodiments, a segmented ICP source is provided with a segmented antenna having locally differing parameters and providing a generally lowered impedance. The antenna is configured to produce enhanced peripheral ionization. Typically, such ionization produces a generally ring-shaped plasma which compensates for the overall chamber and source geometry so as to produce a uniform effective plasma at the surface of the wafer for processing the wafer. The ring-shaped plasma is, in many embodiments, in the form of an annular array of alternating high and low power concentration regions around the periphery of the chamber.

[0055B] Deposition and etching machines for semiconductor wafer processing are provided with an ICP source having multiple sections, providing dual performance. Certain

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portions of the source are provided with shield sections having high-transparency to the RF magnetic field from adjacent sections of an antenna that are configured to deliver maximum power into the plasma. These portions of the source are arranged in a ring in a peripheral area of the chamber and operate in the most effective mode of energy conversion for coupling power into the plasma. Other portions of the source are provided with shield sections that are more opaque to the RF magnetic field from adjacent sections of the antenna that are configured to operate at low efficiency to reduce the amount of power delivered to adjacent hardware. In these portions of the source, the antenna is shielded from the plasma by the opaque shield sections, which also provide complete shielding of the dielectric wall against contamination from the plasma.

[0055C] In certain embodiments, a spiral or annular 3-D antenna has a conductor element that defines angular portions, in some of which the conductors are spatially concentrated while in others the conductors are spatially distributed, producing respectively higher and lower radiation or coupling efficiency of RF energy from such portions. In many embodiments, closely-grouped tubular conductor segments form the spatially concentrated segments while spread-out or divergent conductor segments, or large surface-area segments, form the spatially distributed segments.